

# The Advancing Edge of 3D SPI



## asPIRe 2



**KOH  
YOUNG  
TECHNOLOGY**  
INTELLIGENT  
INSPECTION

The Standard in 3D Measurement & Inspection

# aSPIre 2

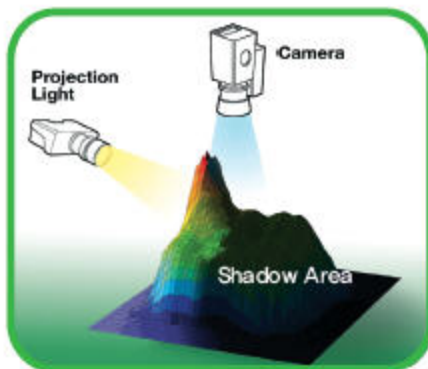
## Revolutionary 3D Measurement & Inspection Technology

aSPIre 2 is the only 3D SPI system that provides a complete solution to the common bottlenecks that hinder conventional inspection systems.

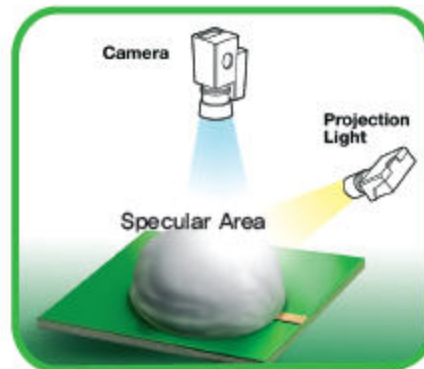
Koh Young's innovative technology provides true, accurate 3D inspection data by solving a number of critical problems that can result in inaccurate and unreliable inspection.

Koh Young's patented 3D measurement and inspection technology in the aSPIre 2 delivers the fastest, the most reliable inspection results and detailed analysis for achieving real process optimization. Falls calls are eliminated, and product defects are prevented.

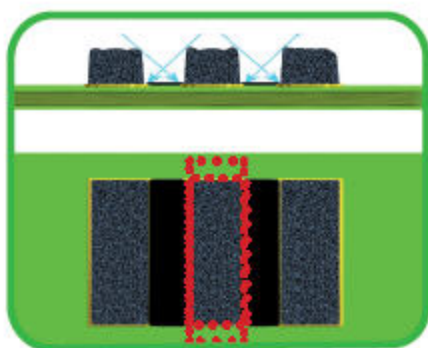
### Conventional SPI Bottlenecks



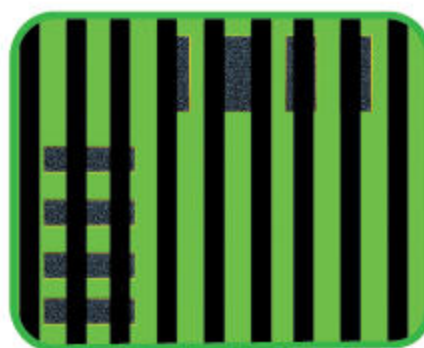
**[Shadow Problem]**  
With single sided projection, all irregularly-shaped objects have shadowed areas that can result in imprecise measurements.



**[Specular Problem]**  
With single sided projection, light reflected back into the camera from areas near the light source causes sensor saturation.



**[Reference Plane Shadow Problem]**  
With finer component pitch, measurement data become less reliable due to a lack of information from the reference plane.



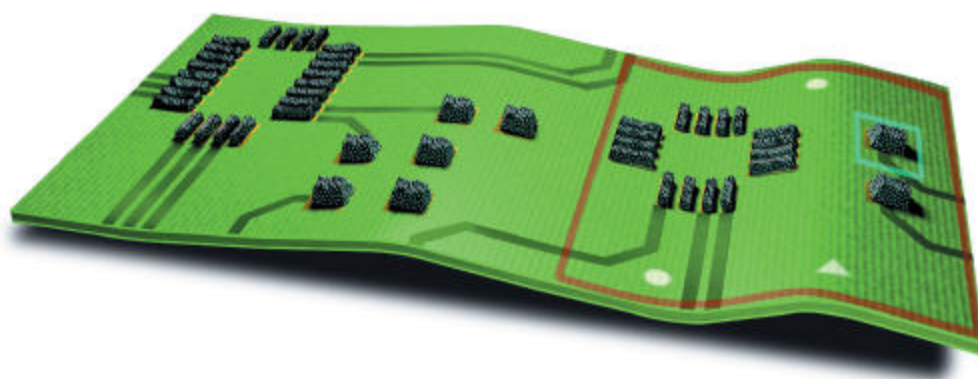
**[Directional Problem]**  
Paste deposits in the same line of direction as projection have less resolution than perpendicular ones.



Using patented 4-way projection technology, aSPIre 2 provides the unique solution for reference plane shadow and directional problems. It's also an advanced solution to conventional shadowing and specular issues.

### PCB Warp Can Cause Inaccurate Measurements

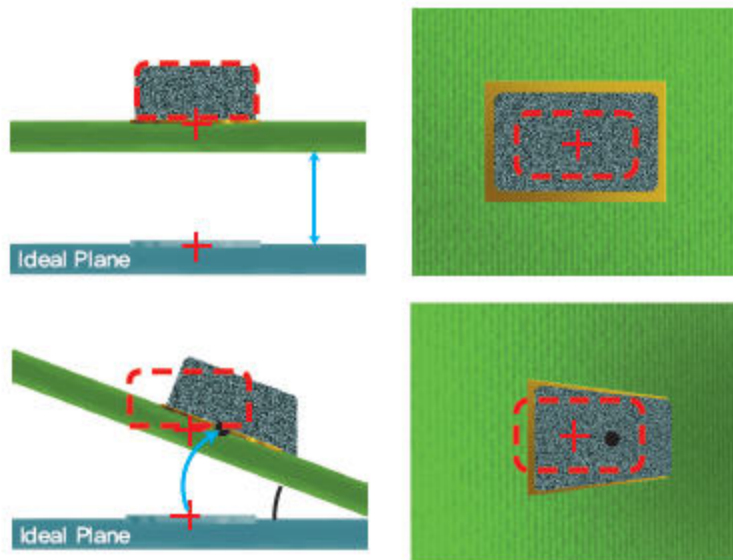
On warped PCBs, pad positions defined by PCB CAD or Gerber files appear distorted. The precise location of printed solders may look different from their real value. Thus, conventional inspection systems will become confused during the inspection process and may provide incorrect data to the user.



PCB warp causes the following critical problems:

3D	<ul style="list-style-type: none"> <li>● Size change due to height difference from the ideal plane</li> <li>● Shape change due to board slope</li> </ul>
2D	<ul style="list-style-type: none"> <li>● Offset due to board shift</li> <li>● X, Y, <math>\theta</math> misalignment caused by board rotation</li> <li>● X, Y, <math>\theta</math> misalignment caused by shrinkage or expansion of the board</li> </ul>

### 3D Problems



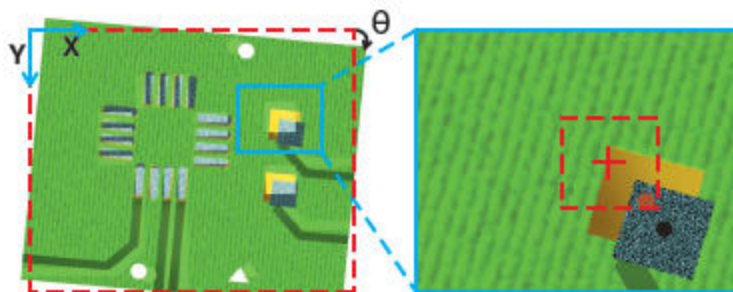
When a PCB moves up or down relative to the ideal plane, the size of an object, from the camera's viewpoint, will appear to be either larger or smaller, respectively.

PCB surface slope deforms the apparent shape of an object under inspection. It also creates an X, Y offset from the center of the ideal position.

#### Koh Young's Innovative 3D solution

**Multi-frequency height measurement technology\*** enables real-time measurement and compensation of board warp, with respect to the ideal plane.

### 2D Problems



Desired FOV position from PCB CAD or Gerber file.

Even after the abovementioned three-dimensional issues have been solved, other problems still remain, including X, Y, and  $\theta$  misalignment resulting from board shift, rotation, shrinkage or stretch.

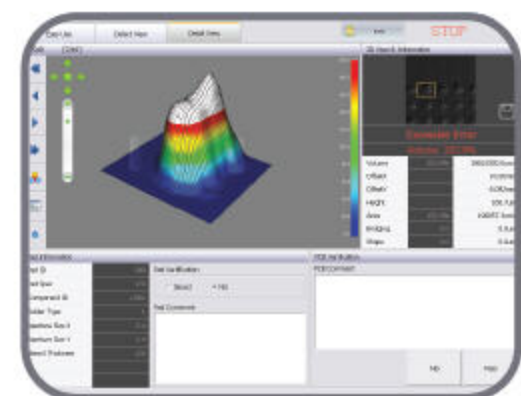
#### Koh Young's Innovative 2D solution

**Pad referencing technology\*** matches, in real time, non-inspection objects (patterns, holes and fiducial marks) on the PCB surface with the ideal PCB surface as defined by the CAD file.

\*Patent Pending

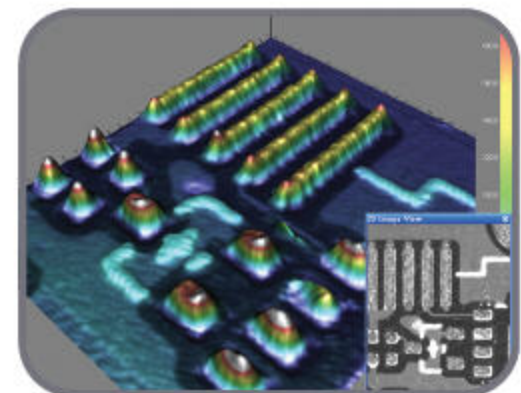
#### New EasyUse GUI interface with simple Touch-Screen operation maximizes customer convenience

New, streamlined menus and a revolutionary new interface make operation easier and simpler. Intuitive 3D viewer gives the operator an at-a-glance instant assessment of test results.



#### Unbeatable Inspection Speed and Performance

- Typical Inspection time of Laptop board(250x225mm) : 10 sec. (at 20  $\mu\text{m}$  resolution)
- << 10% GR&R on 01005 deposits
- Volume repeatability < 0.5 % at  $3\sigma$  on a KY calibration target
- Volume repeatability < 2 % at  $3\sigma$  on a PCB



**Koh Young's patented, authentic 3D inspection is the *only* solution for eliminating false calls.**

## Must-have Requirements of 3D SPI systems

Perfect Solution

	Solution		
Solution to Object Shadow Problem	○	3D Shadow Free Moiré Technology & 4 Way Projection	
Solution to Reference Plane Shadow Problem	○		
Solution to Specular Problem	○		
Solution to Directional Problem	○		
Real-time Solution to 2D Problem	○	Pad Referencing	
PCB Warp Compensation Solution to 3D Problem	○	Multi Frequency Moiré Technology	
Operator User Friendliness	○	EasyUse, Touch Screen Operation	
FOV(Field of View) Size	10 μm* 23.5 x 17.3 mm (0.93 x 0.68 inch)	15 μm* 35.3 x 25.9 mm (1.39x 1.02 inch)	20 μm* 47.0 x 34.6 mm (1.85 x 1.36 inch)
Inspection Time per FOV	High Precision Mode 0.37 sec	0.38 sec	0.40 sec
	High Speed Mode 0.30 sec	0.31 sec	0.33 sec
Height Accuracy (on a KY Calibration Target)	1 μm	1.5 μm	2 μm
Min. Paste Deposit Size	100 μm (3.94 mils)	150 μm (5.91 mils)	200 μm (7.87 mils)
Z Resolution	0.37 μm		
Volume Repeatability	< 0.5% at 3σ (on a KY Calibration Target) , < 2.0% at 3σ (on a PCB)		
01005 Capability	○ 01005 Gage R&R (±50% tolerance) << 10 % at 6σ		
Camera	4M Pixel High Speed Camera		

\*XY resolution

\* Inspection time for the whole PCB varies by PCB condition.

### Inspection Range

Metrology Capability	Volume, Area, Height, Offset, Bridging, Shape Deformity, Coplanarity
Types of Defects	Insufficient/Excessive/Missing Paste, Bridging, Shape Deformity, Paste Offset, Smear, Coplanarity

### Inspection Performance

Max. Paste Size	10 x 10 mm	0.39 inch x 0.39 inch
Max. Paste Height	400 μm	15.75 mils
Min. Distance between Paste Deposit	100 μm (at 150 μm paste height)	3.94 mils (at 5.91 mils paste height)
PCB Color Sensitivity	None	

### PCB Handling

Conveyor Width Adjustment	Automatic
Conveyor Fix Type	Front/Rear Fixed (Factory Setting)

### Software

Inspection Program Generation	Import GERBER Data (274X, 274D) / ODB++ (Optional)
Statistical Analysis Tool	SPC Plus - Histogram, Xbar&R Chart, Xbar&S Chart, Cp&Cpk, %Gage R&R - Real Time SPC & Multiple Display - SPC Alarm - Automatic Report from Remote Computer

User Friendliness	Size Dependant Library for Inspection Condition Setting User Defined Process Stop by Software
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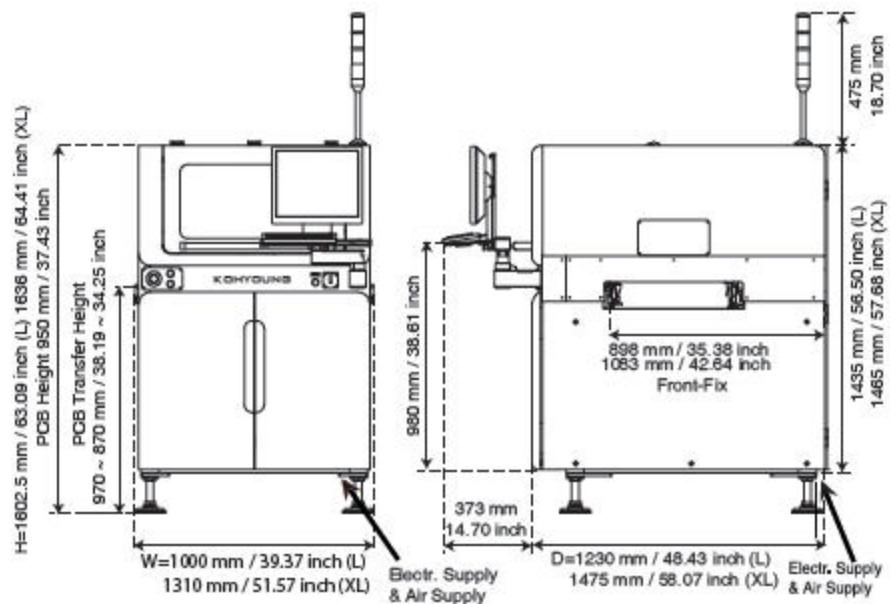
Operating System	Windows XP Professional
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### Options

- Multi-line Monitoring
- Flexible Dual Lane
- Off-line SPC & Defect Review Station
- ODB++ File Conversion
- Off-line Programming Station
- HDD Raid 1 (Mirrored)
- Barcode Reader (1D/2D)
- UPS
- Certified Calibration Target

\* These specifications are subject to change without notice.

	L	XL
Max. PCB Size	510 X 510 mm (20.08 X 20.08 inch)	810 X 610 mm (31.89 X 24.02 inch)
Min. PCB Size	50 x 50 mm (1.97 x 1.97 inch)	
PCB Thickness	0.4 ~ 5.0 mm (0.016 ~ 0.20 inch)	0.5~8.0 mm (0.020 ~ 0.31 inch)
Max. PCB Weight	5.0 kg (11.0 lbs)	10.0 kg (22.1 lbs)
Machine Weight	600 kg (1323 lbs)	850kg (1874 lbs)
Bottom Side Clearance	30 mm (1.18 inch)	
Electrical Supply	200~240 VAC, 50/60 Hz Single Phase	
Air Supply	5 Kgf/cm <sup>2</sup>	



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